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contains also noteworthy contributions from the work of the author. The reader is struck at the outset by the breezy character of the author's style, especially noticeable in the first part of the paper on the methods of manipulation, which contains an energetic appeal to study of the group by a wider circle and full directions for carrying on the work. In the second part the anatomy and physiology of these worms are discussed topically under the various systems. Among the more important points which are new may be mentioned a tabulation of the various forms assumed by the pharynx and œsophagus, together with a terminology for the same. Microchemical demonstration of different uric compounds in preparations of the lateral fields strengthens the belief that the ducts in them are associated with the excretory function.¹ The author argues for a respiratory function of the problematical "lateral organs" present in varying form and development in all (?) the free-living forms, but wanting in the parasitic species, and gives some personal observations on the structure of these little known organs in new members of the group. Various hints make it evident that the author has some radical improvements to suggest on the classification of the nematodes. It is to be hoped that they may be published soon, as the present confusion in the group is exceedingly unfortunate for all students.

The article is illustrated by numerous exceedingly well made woodcuts which represent in many cases new species unaccompanied by any further description than the formula after the fashion set by the author for nematodes, yet the advantage of accurate figures is at once evident. Though the cuts are small and somewhat difficult to decipher, they are very exact, and it is agreeable to see illustrations which are new and which represent the real conditions rather than the author's diagrammatic conception of structure; were these figures only a little larger and more distinct they would be ideal.

H. B. W.

Origin and Development of Sense Organs.—Three popular scientific lectures on the origin and development of sense organs and sensory activities in the animal kingdom have been given by Dr. P. Steffan before the Senckenbergian Natural History Society.² In his intro-

¹ The recent researches of Nassonow, *et alii*, have appeared since the publication of the article.

² Steffan, P. Entstehung und Entwicklung der Sinnesorgane und Sinnesthätigkeiten im Tierreiche, *Ber. Senckenb. Naturf. Gesell.*, Frankfurt a/M. (1898), pp. 29-69.

duction the author points out the dependence of our higher mental activities on the materials furnished by our sense organs. Light, heat, sound, materials of taste and of smell, and direct external contact are the stimuli for the eye, ear, tongue, nose, and outer skin. These, the author declares, are all the forms of sensory stimuli and sense organs known. How such a statement is consistent with the author's opinion as to the source of all our mental materials is difficult to understand, unless he be a man to whom pain, fatigue, hunger, and thirst are unknown.

The relation of sense organs to the medium in which the animal lives is next taken up. Organs of taste and touch are equally possible to water- and air-inhabiting animals, but organs of smell, hearing, and sight are of necessity more restricted to the air-inhabiting forms. Smell, the author believes, is absolutely impossible to water animals, though he offers no explanation of the condition in fishes where the organs which become olfactory in the air-inhabiting vertebrates are so well developed.

The remainder of the lectures is devoted to a condensed account of the sense organs of the animal kingdoms. The so-called vegetative senses—touch, smell, and taste—are first considered, and then what are dignified by the title of animal senses—hearing and sight—are dealt with. Practically nothing novel is introduced in this part of the work, the first portion reading like an abstract of Jourdan's *Senses and Sense Organs of the Lower Animals*, and the second being in large part avowedly taken from Carriere's little book on the eye. The popular treatment of a scientific subject is one of the most difficult tasks an author can set for himself, and to prescribe rules for such forms of composition is well-nigh impossible. Superficiality, however, is never to be tolerated, and superficiality is the characteristic of Dr. Steffan's contribution.

G. H. P.

Eckstein's Zoologie.¹—The German medical student has to pass examinations in zoölogy and comparative anatomy, and as a result a number of these compendia exist, apparently intended to enable the student to cram for examination. We are familiar with several of these syllabi, and this of Eckstein seems, on the whole, the best. It contains a large amount of information, clearly arranged under the heads of history, histology, comparative anatomy, physiology, embryology, paleontology, geographical distribution, phylogeny, taxonomy,

¹ Eckstein, Professor Dr. Karl. *Repetitorium der Zoologie, Ein Leitfaden für Studierende*. Zweite Auflage. Leipzig, W. Engelmann, 1898. 8vo, viii + 435 pp.